REPORT

OF THE

CANADIAN ARCTIC EXPEDITION
1913-18

VOLUME IX: ANNELIDS, PARASITIC WORMS, PROTOZOANS, ETC.

PART G-H: TREMATODA AND CESTODA

By A. R. COOPER

SOUTHERN PARTY, 1913-16

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OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1921

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Issued February 4th 1921

Report of the Canadian Arctic Expedition, 1913-18.

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Issued February 4th 1921

G670. 1913 .26 v.7 pt. 2-4 1-3

Trematodes and Cestodes of the Canadian Arctic Expedition, 1913-18.

A. R. COOPER.

(With two plates.)

INTRODUCTION.

The trematodan and cestodan fauna of the Arctic regions has received not a little attention from investigators up to date, but only a comparatively small amount of material has been collected from that part of the area bordering on the North American continent. It is to Fabricius (1780), who investigated the first of this material which was obtained in Greenland, that we must go for the earliest descriptions of many of our species. Krabbe (1865) studied the avian cestodes in particular and described many species also from Greenland. Zurn (1874) and Comini (1887) dealt with material collected by two polar expeditions and Bergendal (1892) investigated to a certain extent the parasitic fauna of Northern Greenland. But the latest and most important papers are those by Zschokke (1903), Linstow (1905) and Odhner (1905). Zschokke and Odhner studied the cestodes and trematodes, respectively, obtained by the German Expedition of 1898 to Spitzbergen and the neighbouring islands of the Arctic ocean, and Linstow, the nematodes, acanthocephala and cestodes collected by the Russian Polar Expedition of 1900 to 1903.

So far as I am aware the parasitic fauna of the Arctic coasts of Eastern Siberia, Alaska and Canada has not up to the present been investigated, but the collections made by the Canadian Arctic Expedition, in so far as they have already been reported upon, show that the region is rich in new forms and worthy of further intensive study.

MATERIAL.

The material, which was all obtained by Mr. Frits Johansen, consists of one species of trematode only and sixteen species of cestodes. The latter include four considered to be new, one belonging to the genus *Aploparaksis* which was not determined with certainty specifically, and two larval members of the genus *Diphyllobothrium*. To this there are added one species of ectoparasitic trematode, namely, *Epibdella hippoglossi*, which were collected by Mr. C. H. Young, and one of cestode, *Abothrium rugosum*, collected by Mr. Johansen in Nova Scotia. It is thought that since they were also found by Fabricius in Greenland and by Linstow in the European portion of the Arctic Ocean, respectively, and consequently belong to the Arctic fauna, they might well be included here. The writer has some new data on one of them in particular to submit. The trematodes and cestodes are dealt with together in this paper on account of the small number of the former. The following table shows their distribution as regards hosts, localities and dates:—

RECORDS OF THE OCCURRENCE OF TREMATODES AND CESTODES IN HOSTS OF ARCTIC AMERICA.

Parasites.	Hosts.	Localities.	Dates.
Trematodes:			
	Fish:		
Epibdella hippoglossi	*Hippoglossus hippoglossus*	Le Have Island, Nova Scotia	Aug. 9, 1910.
	Mammal:		
Orthosplanchnus arcticus	*Phoca hispida*	Bernard harbour, Dolphin and Union strait, Northwest Territories, Can.	Oct. 18, 1915.
Cestodes:			
	Fishes:		
Schistocephalus solidus	*Pygosteus pungitius*	Bernard harbour, Lake at	July 15, 1915.
Diphyllobothrium sp. larv	*Salvelinus marstoni*	Bernard harbour, Lake at	Oct. 1, 1915.
Cyathocephalus americanus	*Cristivomer namaycush*	Bernard harbour, Lake at	April, 1916.
Bothrimonus intermedius	*Salvelinus malma*	Collinson point, Alaskan Arctic coast.	July 8, 1914.
“ “	“ “	Cockburn point, Bernard harbour.	Aug. 30, 1914, Sept. 6, 1914, End of Aug., 1915.
“ “	*Coregonus* sp.	Marsh River, Collinson point.	July 12, 1914.
“ “	*Zoarces anguillaris*	St. Andrews, New Brunswick.	July, Aug., 1919.
Bothriocephalus scorpii	*Oncocottus quadricornis*	Cockburn point	Aug. 30, 1914, August, 1915.
Abothrium rugosum	*Gadus callarias*	Cheticamp, Cape Breton Island, Nova Scotia.	Sept. 13, 1917.
? “ “	*Tautogolabrus adspersus*	“ “	June 28, 1917.
Abothrium crassum	“Salmon (Dog-Salmon)”?	Port Clarence, Teller, Alaska	July 31, 1913.
“ “	*Cristivomer namaycush*	Bernard harbour, Lake at	June 15, 22, 26, 1915. April, 1916.
“ “	*Salvelinus marstoni*	“ “	Oct. 1, 2, 1915.
Proteocephalus arcticus sp. nov.	“ “	“ “	Oct., 1915.
	Birds:		
Diphyllobothrium canadense sp. nov.	*Corvus corax principalis*	Bernard harbour	Aug. 25, 1915.
Lateriporus geographicus sp. nov.	*Somateria v-nigra*	“	June 27, 1916.
Choanotaenia passerellae sp. nov.	*Passerella iliaca*	Teller, Alaska	Aug. 3, 1913.
Aploparaksis elisae	“ “	“ “	Aug. 3, 1913.
Aploparaksis sp	*Somateria v-nigra*	Bernard harbour.	June 27, 1916.
Fimbriaria intermedia	*Somateria v-nigra*	Bernard harbour	June 27, 1916.
	Mammals:		
Diphyllobothrium cordatum	*Erignathus barbatus*	Bernard harbour	July 4, 1915.
Diphyllobothrium lanceolatum.	“ “	“ “	Aug. 24, 1914. July 4-8, 1915. Sept. 3, 1915.
“ “	“ “	Dolphin and Union strait	Oct. 3, 1914.
Diphyllobothrium sp. larv	“ “	Bernard harbour	July 4, 1915.
Pyramicocephalus phocarum.	“ “	“ “	Aug. 24, 1914. July 4, 1915. Sept. 3, 1915.
“ “ (larval).	*Phoca hispida*	Collinson point	Sept. 7, 1913.
Taenia coenurus	*Canis familiaris*	“ “	Sept. 23, 1913.

Class I TREMATODA

Order I Heterocotylea Monticelli 1892

Family **TRISTOMIDAE** Cobbold 1877

Subfamily **TRISTOMINAE** Monticelli 1892

Genus **Epibdella** Blainville 1828

Epibdella hippoglossi (O. F. Müller 1776)

(Figs. 1 and 2.)

1776:	*Hirudo hippoglossi*	O. F. Müller	1776: 220
	(Type host, *Hippoglossus*;	Denmark)	
1780:	*Hirudo hippoglossi*	Fabricius	1780: 320
1788:	*Hirudo hippoglossi*	O. F. Müller	1788: 18
1790:	*Hirudo hippoglossi*	Gmelin	1790: 3098
1815:	*Phylline hippoglossi*	Oken	1815
1828:	*Epibdella hippoglossi*	Blainville	1828: 567
1843:	*Tristoma hamatum*	Rathke	1843: 238
?1850:	*Phylline hippoglossi*	Diesing	1850: 426
1858:	*Epibdella hippoglossii*	Beneden	1858: 21
1864:	*Epibdella hippoglossi*	Beneden and Hesse	1864: 69
1878:	*Nitzschia hippoglossi*	Taschenberg	1878: 568
1890:	*Epibdella hippoglossi*	Braun	1890: 411, 527, etc.
1891:	*Epibdella hippoglossi*	Monticelli	1891: 105, 125, etc.
1896:	*Epibdella hippoglossi*	Schött	1896: 253
1899:	*Phyllonella hippoglossi*	Goto	1899: 264
1902:	*Epibdella hippoglossi*	Monticelli	1902: 137, etc.
1904:	*Epibdella hippoglossi*	Stafford	1904: 482
1905:	*Epibdella hippoglossi*	Odhner	1905: 370

Specific diagnosis.—With the characters of the genus. Medium large trematodes with elongated, ovoid body having a length and a breadth (exclusive of the posterior organ of adhesion) of 12 to 24 and 8 to 11 mm., respectively. Slightly constricted behind the anterior organs of adhesion. Latter elongated, not excavated and only slightly separated from the body, 1·85 mm. in length by 1·0 in width. Posterior sucker orbicular, 4 to 5·5 mm. in diameter; somewhat thickened anteriorly; inner (ventral) surface provided with small tubercles, radiating posteriorly; anterior hooks almost straight, considerably protruding, 0·56 to 0·77 mm. in length, middle, much curved, 0·86 to 1·40, posterior, with minute hook at tip, 0·99 mm.

Mouth median, ventral and opposite the constriction ("neck"), provided with indistinct lips. Pharynx pentagonal in shape, 0·65 to 0·88 mm. in diameter. Oesophagus surrounded by salivary glands, 0·16 to 0·18 mm. in length. Intestinal coeca almost parallel to the posterior border of the ovary, from which point they diverge to pass close to the outside of the testes, then converge again to be united by one or more commissures near the anterior border of the ventral sucker.

Only one pair of polynuclear giant-cells in the angle between the testes posteriorly.

Outer circular, middle diagonal and inner longitudinal layers of muscles in body; those of sucker very well developed and complicated for the movement of the hooks.

No minute tentacular projections at the anterior tip of the body. Two pairs of eyes. Two chief nerves on each side of the body, connected by seven transverse commissures; one commissure between the median pair of strands at posterior end of body; main nerves pass anteriorly into the brain, situated above the pharynx and composed of two ganglia curved forward and united by five small nerves. Extensive plexus of nerves in posterior sucker.

Opening of excretory cisterns dorsal and behind and in line with the neck at the level of the prostatic portion of the cirrus-sac. One main excretory canal on each side of the body a short distance lateral to the intestinal coeca.

Hermaphroditic duct, about 0·6 mm. in length, opens close behind the left anterior adhesive organ at the neck; into its proximal end the uterus opens slightly ahead of the cirrus. Opening of the vagina ventral and 0·85 to 0·95 mm. directly behind the common genital opening.

Testes at the middle of the body, irregularly elliptical in shape with crenate margins, 1·80 to 2·28 by 1·30 to 1·55 mm. in dimensions, longer axes parallel to longitudinal axis of body. Vas deferens 0·13 mm. in diameter when filled with sperms. Cirrus-sac pyriform, 0·84 to 0·88 by 0·45 to 0·56 mm. in dimensions; prostatic reservoir ellipsoidal, 1·00 to 1·50 by 0·65 to 0·95 mm.

Ovary median, ovoid in shape, 0·75 to 0·95 mm. in transverse diameter; ova from beginning of oviduct 35 to 40μ in diameter. Oviduct 0·16 mm. in diameter at its point of exit from the ovary which is slightly to the right of the median line, narrowing to 20μ where it is joined by the common vitelline duct and to 25μ where the seminal vesicles, five or six in number, unite with it. Shell-glands equidistant from the seminal vesicles and the ootype. Latter spindle-shaped, 0·15 mm. in diameter. Bulb of uterus 1·0 mm. in diameter. Vitelline reservoir subspherical, 0·65 to 0·80 mm. in diameter, pressed close to the anterior border of the ovary slightly to the left of the median line; common vitelline duct 35μ in diameter. Vagina arises from the left antero-lateral margin of the vitelline reservoir.

Eggs, tetrahedral, with long slender filaments.

Habitat.—Skin of *Hippoglossus hippoglossus* (L.), the halibut; La Have island, Nova Scotia, collected by C. H. Young.

The above comparatively lengthy diagnosis of this form is given not only for the sake of bringing together its main specific characters, which are somewhat scattered throughout the literature, but in order also to include some new measurements and diagnostic differences. No one seems to have pointed out clearly, for instance, that the anterior pair of hooks of the posterior sucker protrude considerably from the ventral surface of the organ. Consequently figure 2 is here given to show this feature in lateral view. Figure 1 shows the hooks in ventral view. It will be noted that in both figures they are inclined at an angle of about 45 degrees to the median sagittal plane. Furthermore, so far as I have been able to ascertain, the dimensions of the egg have, unfortunately, not been given; but, owing to the fact they they are laid singly and that the material studied was not in the best state of fixation and preservation, I am only able to say that they are, as in other species of the genus, tetrahedral in shape and each provided at one corner with a long slender filament.

Order II MALACOCOTYLEA Monticelli 1892

Suborder PROSOSTOMATA Odhner 1905

Family **FASCIOLIDAE** Railliet 1895

Subfamily **BRACHYCLADIINAE** Odhner 1905

Genus **Orthosplanchnus** Odhner 1905

Orthosplanchnus arcticus Odhner 1905

(Fig. 3)

1905: *Orthosplanchnus arcticus*, ...Odhner...... 1905: 339
(Type host, *Erignathus barbatus* (Erxleben), bearded seal, west coasts of Greenland and Spitzbergen)

Specific diagnosis.—With the characters of the genus. Small trematodes from 3·5 to 7 mm. in length and 0·70 to 1·15 mm. in breadth. Maximum width usually in the middle third of the length ; body narrowing posteriorly more gradually than anteriorly ; anterior end bluntly rounded, posterior more pointed ; thickness two-thirds to three-quarters of width. Skin provided with spinelets, hooked and 0·04 mm. in length anteriorly, sparse and smaller behind. Suckers well developed and about the same size, ventral usually a little smaller than the oral; diameter of latter, 0·48 to 0·60 mm., of former, 0·40 to 0·53; oral sucker subterminal, acetabulum situated in the anterior part of the second quarter of the body.

Spacious prepharynx, may be elongated during life to 0·20 mm. Pharynx comparatively large, spherical to somewhat elongated, 0·4 mm. in length by 0·3 in width. Oesophagus 0·12 to 0·15 mm. long, with lining of cuticula. Anteriorly directed diverticula of the intestinal coeca extend slightly beyond the anterior border of the pharynx; coeca themselves extend to posterior end of body without branches or pouches.

Simple, tubular excretory vesicle, dorsal in position, its blind anterior end lies opposite or extends slightly beyond the anterior border of the anterior testis; gives off two main vessels with wide lumina and likewise dorsal in position.

Genital pore median, situated close to anterior edge of acetabulum. Spacious genital sinus, from 0·1 to 0·2 mm. in length.

Testes elliptical or elongated oval in shape, outline slightly irregularly indented; anterior often a little smaller than posterior; beginning a little ahead of the equator of the worm they occupy the third quarter of its length; anterior, 0·52 to 0·72 mm. in length by 0·24 to 0·30 in breadth, posterior, 0·76 to 0·98 and 0·26 to 0·32, respectively. Seminal vesicle, 0·25 mm. in diameter when full, pars prostatica and ductus ejaculatorius, each from 0·17 to 0·20 mm. in length, and cirrus, all within a cirrus-sac provided with inner circular and outer longitudinal muscles and lying dorsal to acetabulum, its posterior end extending nearly half way from latter to anterior testis; cuticular lining of cirrus armed with stout hollow spinelets, 40 to 45μ in length and 7μ in thickness at their bases which are 15 to 19μ in diameter, excepting for a short distance near its end.

Ovary spherical to oval in shape, 0·16 mm. in diameter, situated to right of midline, immediately ahead of anterior testis and ventral. Oviduct arises dorsally from anterior or medial margin of ovary. Spherical receptaculum seminis, 36μ in diameter at the point of union of Laurer's canal with the oviduct (Fig. 3). Vitelline follicles, extending from the level of the pharynx to the posterior end, surround the intestinal coeca dorsally, laterally and ventrally, the lateral halves of the mantle coming together occasionally between the testes, a little more ventrally than dorsally; almost meeting dorsally ahead of the acetabulum, they remain lateral ventrally. Paired anterior and posterior vitelline ducts, latter sometimes uniting behind the testes for a short distance; dorsal right and left vitelline ducts empty into a dorsal vitelline reservoir which may be as much as 125μ in diameter when full. Uterus extends slightly behind the acetabulum; it is lined with cuticula 45μ in thickness, bearing straight spinelets, 40μ in length, and is surrounded by powerful circular muscles and a thick mantle of cells.

Eggs, from 90 to 100μ in length by 50 to 59μ in diameter; operculum thinner than the remainder of the shell.

Habitat.—Liver of *Phoca hispida* Schreber, common rough seal; Bernard harbour (Dolphin and Union strait), Northwest Territories, Canada, October 18, 1915; C.A.E. Station 42*t*.

The specimens studied differed from Odhner's description of *O. arcticus* in the following points: The skin was only sparsely provided with straight spinelets anteriorly, but this was considered to be due to the comparatively poor state of fixation and preservation of the worms, the evidence being that most of the spinelets had been rubbed off; the pharynx was spherical rather than slightly elongated; the anterior coeca extended a little beyond the anterior edge of the pharynx; the blind anterior end of the excretory vesicle extended ahead of the anterior border of the anterior testis as far as the vitelline reservoir; the genital sinus was a little shallower; the posterior end of the cirrus-sac reached to a level behind the acetabulum about two-fifths of the distance from it to the anterior testis; the ovary was almost exactly spherical rather than "transversely oval"; but all of these differences are considered to be minor variations and not of sufficient importance to affect the diagnosis of the species.

Class II CESTODA

Subclass CESTODA s. str.

Order I PSEUDOPHYLLIDEA Carus 1863, nec Lühe 1910, nec Cooper 1919, e.p.

Polyzootic, seldom monozootic, cestodes with mostly unarmed scolex without rostellum or proboscis formation, excepting in the Haplobothriinae where the primary scolex is provided with four protrusible proboscides resembling those of the Trypanorhyncha. Usually with two weakly developed sucking grooves, which in individual cases are modified by the strong development of their walls or by more or less extensive fusion of their edges, so that they may appear funnel-shaped or tubular, which may also unite with each other more or less completely to form an unpaired terminal adhesive organ, or become rudimentary or entirely absent, in which latter case they are replaced by a terminal functional organ of attachment. The development of a pseudoscolex takes place occasionally. No headstalk (as in the Trypanorhyncha). External segmentation more or less pronounced in the cases of multiplicity of the genital organs, only seldom completely absent. Genitalia in each segment usually single, seldom double. Their development proceeds from ahead backwards only in their beginning and does not continue to a degeneration of the reproductive glands; but the majority of the proglottides, being at the same stage of development, bring their sexual products to maturity at the same time, so that in all of them new eggs are formed continuously and all the eggs of the whole animal are at the same stage of development. A surficial opening of the uterus is always present.

Testes numerous; vas deferens strongly coiled, without a true seminal vesicle. Ovary near the posterior end of the proglottis, mostly median in the case of single genitalia, seldom approaching the margin of the strobila bearing the genital opening (that of the cirrus and vagina). Vitelline follicles very numerous, mostly in the cortical, seldom in the medullary parenchyma. Uterus a more or less winding canal, the individual coils of which converge somewhat towards the centre of the proglottis to form the so-called rosette; but in other forms it enlarges to form a capacious cavity, the uterus-sac, from which the duct-like beginning of the uterus is sharply separated. Eggs operculate or non-operculate, developing mostly only after being laid, but in other cases within the uterus.

This diagnosis of the order is that which I recently (1919:301) published, revised to include the family Caryophyllaeidae Lühe 1910, e.p. Cooper 1920, which, after my study of *Glaridacris catostomi*, I agree with Lühe rightly belongs to the Pseudophyllidea.

Family I **DIPHYLLOBOTHRIIDAE** Lühe 1910, e.p. Cooper 1919

Subfamily I **LIGULINAE** Lühe 1899

Genus **Schistocephalus** Creplin 1829

Schistocephalus solidus (O. F. Müller 1776)

For a synonymy and a diagnosis of this species see Cooper, 1919: 318-29.

Habitat.—The abdominal cavity of *Pygosteus pungitius* L., a stickleback; lake at Bernard harbour, July 15, 1915; C.A.E. Station 40*j*. Only one worm from each of two specimens of the host was taken.

Subfamily II **DIPHYLLOBOTHRIINAE** Lühe 1910

Genus I **Diphyllobothrium** Cobbold 1858, e.p. Lühe 1910

Diphyllobothrium canadense, sp. nov.

(Figs. 4, 5, 11.)

Specific diagnosis. -With the characters of the genus. Large cestodes at least 235 mm. in length and 6·5 in maximum width. Scolex small, elongated, rectangular in outline surficially and laterally, excepting for rounded summit. 0·84 mm. in length, 0·37 in width at base and 0·46 in thickness at middle. Bothria long and narrow, not sharply separated posteriorly from surfaces of strobila. Neck, 0·7 mm. in length. First segments, 0·045 mm. in length by 0·50 in width; width of segments 30 mm. from scolex, 3·0 mm., 37·5 from scolex, 3·5 by 0·65 in length. At about its middle, where the segments are 6·5 mm. in width by 0·60 in length, the strobila is ruffled or frilled laterally. Hindermost gravid segments from two or more to one and a half times as broad as long anteroposteriorly. Posterior borders moderately prominent throughout.

Cuticula 4·5μ in thickness, outer half cirrous. Main longitudinal parenchymatous muscles scarcely arranged in fascicles, whole layer 35μ in thickness. Calcareous bodies ellipsoidal in shape, at least 10 μ in length. Nerve strands 0·22 to 0·23 of width of proglottis from margins.

Rudiments of the genitalia appear 6 mm. behind the scolex, the first eggs about 20 mm. Genital cloaca median, one third of the length of the segment from its anterior border, 160μ in diamter by 80 in depth. Vaginal opening immediately behind that of cirrus and very slightly to one side; beginning of vagina alternates irregularly from right to left opposing the lower portion of the cirrus-sac.

Testes continuous from proglottis to proglottis and from side to side between the consecutive, centrally located sets of female genitalia; at least 150 in number; ellipsoidal in shape, the greatest diameter being transverse, 55 to 90μ in length, 110 to 145 in width and 60 to 90 in depth. Vas deferens 25μ in diameter; only slightly coiled dorsal and somewhat posterior to the cirrus-sac, coils 0·14 mm. in length, 0·40 in width and 0·20 in depth. Seminal vesicle spheroidal, thick-walled, muscular, posterodorsal to cirrus-sac and a little to one side of the median line directly above the beginning of the vagina, 90 to 145μ in diameter. Vas deferens 18μ in diameter as it pierces the wall of the cirrus-sac in the median line, only slightly enlarged and coiled in the dorsal half of the cirrus-sac. Cirrus, 40 to 55μ in diameter, occupies the ventral half of the pouch. Cirrus-sac ovoid in shape with the narrower end ventral; dorsal end deflected slightly from the median line to the side opposite that occupied by the seminal vesicle and the beginning of the vagina; 0·30 to 0·32 mm. in length (depth by 0·15 to 0·20 in diameter; connected to the dorsal body-wall by numerous stout retractor muscle-fibres, many of which pierce its wall and are attached to the proximal end of the cirrus proper at the middle of the sack.

Just within its opening the vagina, slightly enlarged to a diameter of 40μ, carves dorsally and somewhat aside to reach the median line and take a straight course posteriorly close against the ventral wall of the medulla. Half way along its course it is reduced to 22μ in diameter. Above the ovarian isthmus it gradually becomes enlarged to as much as 100μ in diameter to form an elongated seminal receptacle, having comparatively thick walls. Spermiduct 30μ in length by 8μ in diameter. Ovary near the posterior border and ventral musculature of the proglottis, 0·50 to 1·30 mm. in width by 0·18 to 0·28 in length by 0·20 in thickness, irregularly lobulated laterally, the lobules intermingling somewhat with the coils of the uterus; isthmus 60μ in diameter. Oocapt 28 to 30μ in diameter. Vitelline follicles closely crowded together, continuous from segment to segment and at the margins and anterior and posterior borders of the proglottides, leaving free more or less circular areas above and below the uterus and somewhat smaller than the uterus; 1,500 to 2,000 per segment; ellipsoidal in shape with the longitudinal axes dorsoventral, slightly compressed anteroposteriorly; average length, width and depth, 40, 75 and 85μ, respectively. Common vitelline duct short, expands to form a reservoir 35 to 40μ in diameter just before joining the oviduct. Shell-gland diffuse, some of its cells extending to the ventral musculature. Uterine rosette circular or elliptical in surficial view, 0·85 to 1·20 mm. in length, 1·20 to 1·70 in width and 0·50 to 0·60 in depth, composed of 8 to 10 coils on each side of the median line, the most anterior pair of which pass forward on each side of the cirrus-sac. In the oldest segments the walls of the uterus break down, thus converting the rosette into a more or less undivided sac. Opening of uterus at the centre of the proglottis, 70 to 75μ in diameter.

Eggs, brownish yellow in colour, ellipsoidal in shape, 56 to 59μ in length by 37 to 39μ in diameter; operculum 15 to 20μ in diameter, shell 2·5 to 2·8μ in thickness; boss at the end opposite that bearing the operculum, 4μ in diameter.

Type host.—*Corvus corax principalis* Ridg., the northern raven, in the intestine.

Type locality. Bernard harbour, Northwest Territories, Canada.

Collected by Mr. Frits Johansen, August 29, 1915.

Cotypes are deposited in the Victoria Memorial Museum, Ottawa, Canada, (Annelids, etc., catalogue No. 76), and in the collection of the writer at Chicago, U.S.A.

This form obviously does not belong to any of the three species of *Diphyllobothrium* which have been described from birds in Europe, namely, *D. ditremum* (Creplin), *D. dendriticum* (Nitzsch) and *D. fissiceps* (Creplin), the first of which was reported by Linstow (1905: 16) from a young male *Larus glaucus* F. from West-Tajmyr, Middendorffsbay. However, it resembles in many respects *Dibothrium cordiceps* Weinland as described by Linton (1891) from *Pelecanus erythrorhynchus* at Yellowstone Lake. The superficial characters and measurements of the two forms agree fairly well, while the anatomy of *D. cordiceps* is undoubtedly that of a species of *Diphyllobothrium*—as suggested by Ward (1918:432)—very close to if not indentical with this cestode. In *D. canadense*, however, I saw no distinct expansion of the vagina at its beginning to form an outer seminal receptacle, as described by Linton, nor eggs with measurements as large as those he gave, namely 70 by 35μ. Consequently until *D. cordiceps* is removed from the *species inquirendae*, it seems advisable to record this form under a new name.

Diphyllobothrium cordatum (Leuckart 1863)

This species has been sufficiently described for diagnostic purposes by Zschokke (1903:4-6).

Seven specimens were found in company with *D. lanceolatum* and *Pyramicocephalus phocarum*, the next two species, in the lot of material labelled, "From the intestinal channel of *Phoca* [*Erignathus*] *barbata*, Bernard harbour, Northwest Territories, July 4, 1915, C.A.E. Station *40t.u.*"

The three largest specimens, somewhat larger than those described by Zschokke, had the following dimensions: 136 mm. in length by 4 in width, 140 by 6 and 154 by 6·5. The scolices were somewhat smaller, being only 1·3 mm. in length and depth as compared with 1·8 and 1·8 given by Zschokke and 2 and 2 by other writers. Including the two or three smallest and most posterior loops of the uterus there were 8 to 10 loops on each side of the median line rather than 6 to 8; and the eggs measured 70 to 72μ by 50μ in alcohol and 62 to 68 by 41 to 45μ in synthetic oil of wintergreen in which the specimens studied were cleared. These data indicate, incidentally, the marked variability in the shape and dimensions of the eggs after complete dehydration and the consequent necessity of measuring them in the original preserving fluid if not in the fresh condition, especially in view of the fact that in this regard the species of *Diphyllobothrium* which have been reported from seals approach each other so closely as to overlap in many cases.

Diphyllobothrium lanceolatum (Krabbe 1865)

This species has also been well described by Zschokke (1903:6-9).
Habitat.- Intestine of *Erignathus barbatus* (Erxleben), as follows:

THE OCCURRENCE OF *DIPHYLLOBOTHRIUM LANCEOLATUM* IN *ERIGNATHUS BARBATUS* IN ARCTIC AMERICA.

Locality.	Date.	C.A.E. Station.	Accompanied by
Bernard harbour, Northwest Territories	Aug. 24, 1914	37*a*	*P. phocarum*
Dolphin and Union strait, Northwest Territories	Oct. 3, 1914	37*o*	
Bernard harbour	July 4, 1915	40*t*, *u*	*D. cordatum* *P. phocarum* *D.* sp. larv
" "	July 4-8, 1915	40*t*, *u*	
" "	Sept. 3, 1915	42*c*	*P. phocarum.*

The material studied differed from that studied by Zschokke in the following points: The specimens were larger, the dimensions of three of the largest being, 50 by 2·9 mm., 59 by 4 and 68 by 3; the most anterior coils of the uterus were not strictly to the right and left of the cirrus-sac but rather behind the middle of it; eggs appeared first in the 45th to 60th segment, instead of the 30th, and they were longer - 64 to 68μ by 40μ (cf. Zschokke's 62 by 40μ).

Diphyllobothrium sp. larv.

A large number of larval diphyllobothria varying in length from 6 to 25 mm. and in width from 0·6 to 2·5 mm. were found in company with *D. lanceolatum* in the lot of material collected on July 4, 1915 at C.A.E. Stations 40*t* and *u*. They are considerably depressed, lanceolate in shape, and correspond with those described by Zschokke (1903:12-13, Fig. 17, Taf. II) as accompanying larvae of *D. schistochilos* (Germanos) in the intestine of *P. barbata* and doubtfully considered by him as being larvae of *D. schistochilos*. The material in question resembles *D. lanceolatum* rather than the latter species as described by Germanos (1895), but on account of the fact that there were present in the lot of material no specimens intermediate in size between the largest of the larvae and the smallest of those diagnosed as *D. lanceolatum* I cannot say positively that they are larvae of the latter species.

Diphyllobothrium sp. larv.

(Figs. 6, 7.)

To this genus there is also referred a lot of four poorly preserved bothriocephalid larvæ which were found in the intestine of a red Canadian trout, *Salvelinus marstoni* Garman, from a lake at Bernard harbour, on October 1, 1915, C.A.E. Station 42*o*,*x*, in company with *Abothrium crassum* and *Proteocephalus arcticus* (vide infra). The specimens are all about 9 mm. in length and from 0·6 to 0·9 mm. in width. The scolex (Figs. 6, 7) bears two elongated, dorsoventrally situated bothria with comparatively thin walls, and on the whole resembles that of species of *Diphyllobothrium* rather that that of species of *Both-*

riocephalus. The body is depressed and ligulate, the margins being parallel for almost the whole length and the posterior end gradually tapered to a diameter slightly smaller than the tip of the scolex.

On the whole these larvæ resemble others that I have taken from cysts in the wall of the stomach of *Lota maculosa* (LeSueur), the burbot, at Port Credit, Ontario, near Toronto, and at Charlevoix, Michigan, and which may be similar to those Nickerson (1906) found in fishes from the Great Lakes but suspected might belong to species other than *Diphyllobothrium latum*, the broad human tapeworm. Incidentally the writer is conducting feeding experiments with the larvæ from the burbot in an endeavour to ascertain whether they are young of *D. latum* and whether the cases of infection with this cestode in America can be accounted for in this direction.

Genus II **Pyramicocephalus** Monticelli 1890

Pyramicocephalus phocarum (Fabricius 1780)

This species, described by Linstow (1905:14-15) under the name of *P. anthocephalus* (Rud.), was collected from *Erignathus barbatus* (Erxleben), bearded seal, as follows:

THE OCCURRENCE OF *PYRAMICOCEPHALUS PHOCARUM* IN *ERIGNATHUS BARBATUS* IN ARCTIC AMERICA.

Locality.	Date.	C.A.E. Station.	Accompanied by.
Bernard harbour, Northwest Territories……	Aug. 24, 1914.	37*a*	*D. lanceolatum.*
" " " " ……	July 4, 1915……	40*t,u*	*D. cordatum.*
" " " "	Sept. 3, 1915	42*c*	*D. lanceolatum.*

The largest specimen, one from Station 40*t,u*, measured 900 mm. in length by 6 mm. in maximum width and its scolex, 4 mm. in length, 2 in width and 3 in depth. Another from the same lot was 320 mm. by 5 in dimensions. The eggs, when measured in the sections, were found to vary from 58 to 65μ in length by 34 to 39 in width. Linstow gave their measurements as 65 by 39μ.

Two larvæ as well as adults, were found in the material from Station 40*t,u*, while another larva was all that was taken from a specimen of common rough seal, *Phoca hispida* Schreber, at Collinson point, Alaska, on September 7, 1913, at Station 27*j*.

Subfamily III **Cyathocephalinæ** Lühe 1899, e.p. Cooper 1919

Genus I **Cyathocephalus** Kessler 1868

Cyathocephalus americanus Cooper 1917, e.p

1917: *Cyathocephalus americanus*… COOPER…………… 1917: 35
(Type host, *Coregonus clupeiformis*, whitefish, Georgian Bay, Lake Huron)
1919: *Cyathocephalus americanus*… COOPER…………… 1919: 341

Specific diagnosis.—With the characters of the genus. Small cestodes, attaining a length of at least 16 mm. with a maximum breadth of 1·7 mm. Scolex funnel-shaped, 0·3 to 0·9 mm. long and 0·5 to 1·50 broad, with a revolute margin. Neck 1·0 to 3·0 mm. in length. Segments twice as broad as long, terminal one rounded.

Cuticula 5 to 6μ in thickness, with neither hooks nor spines; sub-cuticula 25 to 40μ.

Ten to twenty sets of genitalia, beginning 1·5 to 5·0 mm. from the anterior end. Strong tendency for the reproductive apertures to lie all on one surface of the strobila. Vagina opens behind the uterus. No papillae around the female opening but the atrium is surrounded by a sphincter from 15 to 30μ in thickness.

Testes in two lateral fields in the medulla of the anterior portion of the proglottis, 60 to 115μ in diameter. Coiled vas deferens antero-dorsal to the cirrus-sac; no seminal vesicle before entering the cirrus-sac nor connective tissue sack surrounding the whole duct. Protruded cirrus 0·2 mm. in length by 0·12 in diameter at base. Cirrus-sac ovoid in shape, 0·20 to 0·26 mm. in length by 0·18 in diameter; no retractors connecting it with the dorsal body-wall; large mass of glandular pigmented cells surrounding it dorsally and laterally.

Vagina 12 to 18μ in diameter; no sheath near its opening; receptaculum seminis 35 to 75μ in diameter. Spermiduct very short and narrow, 20 to 25 by 8 to 9μ, respectively. Ovary tubulolobular, fan-shaped; wings extend laterally and dorsally around the central connections of the female ducts; isthmus prominent, 0·18 by 0·12 mm., ova in same, 12 to 15μ in diameter. Oocapt 25 to 28μ in diameter. Vitelline follicles continuous from proglottis to proglottis, forming a layer 75 to 90μ thick in the cortical parenchyma, 20 to 35 in transections. Shell-gland dorsal. Uterine rosette not surrounded by a muscular sac, but the organ is enveloped proximally by numerous shell-glands.

Eggs, 40 by 30μ.

Habitat.—The intestine of *Cristivomer namaycush* (Walbaum), the lake trout; lake at Bernard harbour, C.A.E. Station 50*g*, April, 1916.

Only one specimen was found in the material from Station 50*g*, which otherwise belonged to *Abothrium crassum*, *Echinorhynchus salvelini* and *E. coregoni*, and, while undoubtedly belonging to *C. americanus*, was in many respects much larger than any of those formerly studied. Consequently I submit the above partly emended specific diagnosis to cover this case. The most striking anatomical feature presented by this specimen is the comparatively large sphincter muscle surrounding the aperture of the female genital atrium, a structure which I have also been able to find on re-examination of the material upon which the original description of the species was based.

Genus II **Bothrimonus** Duvernoy 1842, e.p. Cooper 1919

Bothrimonus intermedius Cooper 1917, e.p.

1917: *Bothrimonus intermedius*......COOPER..............1917: 35
(Type host, *Pseudopleuronectes americanus*; St. Andrews, New Brunswick)
1919: *Bothrimonus intermedius*......COOPER..............1919: 351

Specific diagnosis.—With the characters of the genus. Small cestodes up to 50 mm. in length and 2·8 in width. Scolex almost spherical, 0·48 to 0·72 mm. long, 0·50 to 0·84 wide and 0·60 to 1·0 thick. Bothria hemispherical, their apertures ordinarily not fused to form a single terminal opening. Strobila uniform in width from a short distance behind the scolex to the posterior end; 0·4 to 0·6 mm. in thickness; slightly more convex ventrally than dorsally.

Cuticula, 5 to 10μ in thickness. Nerve strands 12 to 20μ in diameter; each divides into two branches sagitally before entering the scolex; transverse commissure diffuse. Four main excretory trunks in ripe proglottides, six farther forward passing into the scolex; all in the medullary parenchyma.

Reproductive organs begin 0·3 to 1·5 mm. from the scolex; up to 160 in number. Weak sphincter around the common female cloaca. Vagina opens close behind the uterine pore which is not quite in the median line.

Testes in two lateral fields and two layers between the excretory trunks, continuous from proglottis to proglottis; spherical in shape, 75 to 100μ in diameter. Coils of vas deferens anterodorsal to cirrus-sac, the duct 15 to 30μ in diameter, depending on the amount of spermatozoa it contains. Cirrus-sac oval, 0·23 to 0·29 by 0·15 to 0·17 mm.; everted cirrus, 60 by 85μ.

Vagina, 10 to 25μ in diameter; receptaculum seminis, 40 to 60μ; spermiduct 10μ. Ovary crescentic in shape, wings tubulolobular; isthmus almost spherical, 0·1 mm. in diameter. Oocapt, 25 to 30μ in diameter, oviduct 15 to 20μ. Common vitelline duct 120 by 30μ. Vitelline follicles spherical, 60 to 90μ in diameter; in the lateral thirds of the strobila, continuous at the margins of the same and from proglottis to proglottis. Shell-gland obscure. Uterus surrounded by glandular cells proximally; 0·25 mm. in maximum diameter.

Eggs, 36 to 40 by 24 to 25μ in dimensions.

Habitat. The intestines of *Salvelinus malma* (Walbaum) and a whitefish, *Coregonus* sp. as follows:

THE OCCURRENCE OF *BOTHRIMONUS INTERMEDIUS* IN HOSTS OF ARCTIC AMERICA.

Host.	Locality.	Date.	C.A.E. Station.
Salvelinus malma	Collinson point, Alaskan Arctic Coast.	July 8, 1914	28*o*
" "	Cockburn point, Bernard harbour, Northwest Territories.	Aug. 30, 1914	37*d*
" "	" " "	Sept. 6, 1914	37*h*
" "	" " "	End of August, 1915.	41*y*
Coregonus sp.	Marsh river, Collinson point, Alaska.	July 12, 1914	28*p*

As in the case of *Cyathocephalus americanus* the original diagnosis of this species is here amended in part owing to the fact that the material listed above gave measurements which are considerably larger than those set forth previously by the writer. Other characters of a qualitative nature, however, clearly indicate that the form belongs to *B. intermedius* and is quite different from the European and other species, of which *B. olrikii* (Krabbe 1874) (=*Diplocotyle olrikii*) was found in *Samo carpio* in Greenland, and *B. cohaerens* (Linstow 1903.) (=*D. cohaerens*) in *Pleuronectes flesus* on the Murman coast.

I should like, furthermore, to take this opportunity of adding a fourth host for this species of cestode, namely *Zoarces anguillaris* (Peck), the eelpout, from which Dr. W. A. Clemens of the University of Toronto obtained several lots of material at St. Andrews, New Brunswick, in the summer of 1919, and sent them to me recently for determination.

Family II **PTYCHOBOTHRIIDAE** Lühe 1902

Sub-family I **Ptychobothriinae** Lühe 1899

Genus **Bothriocephalus** Rud. 1808, e.p. Lühe 1899, e.p. Cooper 1919

Bothriocephalus scorpii (Müller 1776)

For a comprehensive synonymy and a diagnosis of this species see Cooper, 1919: 384-402.

Habitat.—Intestine of *Oncocottus quadricornis* L., four-horned sculpin, Bernard harbour and Cockburn point. August 30, 1914, C.A.E. Station 37*d*, and August, 1915, Station 41*y*.

Subfamily II **AMPHICOTYLINAE** Lühe 1902

Genus **Abothrium** Beneden 1871, char. emend. Lühe 1899

Abothrium rugosum (Batsch 1786)

For a description and discussion of this species see also Cooper, 1919: 460-73.

Habitat.—Intestine of *Gadus callarias* L., the cod, Cheticamp, Cape Breton Island, Nova Scotia, September 13, 1917, and (?) *Tautogolabrus adspersus* W., the cunner, at the same locality, June 28, 1917.

The material from the latter host consisted of several gravid portions of strobilas, very much contracted and degenerated, which I was not able to locate with certainty. They probably belong to this species and their condition may be due to their having been picked up as very old fragments by the fish and their having failed to continue their existence in the cunner, which is not normally a host of *A. rugosum*.

Abothrium crassum (Bloch 1779)

This species has also been dealt with at length by the writer elsewhere (1919: 474-88).

Habitat.—Intestines of the following hosts:

THE OCCURRENCE OF *ABOTHRIUM CRASSUM* IN HOSTS OF ARCTIC AMERICA

Host.	Locality.	Date.	C.A.E. Stn.	Accompanied by.
"Salmon (Dog-Salmon?)"	Port Clarence Teller, Alaska.	July 31, 1913.	20*d*	
Cristivomer namaycush	Lake at Bernard harbour, Northwest Territories.	June 15, 22, 26, 1915.	40*f, g, i*	*Echinorhynchus** *salvelini.* *E. coregoni.*
" "	" "	April, 1916	50*g*	*E. salvelini.* *E. coregoni.* *C. americanus*
Salvelinus marstoni	" "	Oct. 1, 2, 1915.	42*o, r*	*E. coregoni* *P. arcticus.*

*See "Acanthocephala", Vol. IX, Part E: 5-6, of this Report, by H. J. VanCleave.

Order II TETRAPHYLLIDEA Carus 1863

Family **PROTEOCEPHALIDAE** LaRue 1914

Genus **Proteocephalus** Weinland 1858

Proteocephalus arcticus, sp. nov.

(Figs. 8, 12.)

Specific diagnosis.—With the characters of the genus. Small cestodes from 8·5 to 15 mm. in length and 0·80 to 1·02 mm. in breadth. Scolex short, somewhat flattened, truncated, unarmed, 0·30 mm. in length by 0·43 in width. Four suckers, muscular, with deep cavities, slightly directed forward, circular in outline, 0·18 mm. in diameter. Fifth sucker vestigial. Neck not well differentiated from strobila, about 1·8 mm. in length by 0·32 in width. Surface smooth; segmentation evident only in posterior one-third to one-half of strobila, posterior margins of segments do not protrude, lateral margins convex, transverse intersegmental furrows shallow; 15 to 20 proglottides in all. First proglottides each broader [illegible] long, 0·45 to 0·50 mm. by 0·18 to 0·22; mature segments about quadrate or somewhat broader than long, 0·72 in width by 0·48 to 0·60 in length: ripe joints quadrate to somewhat longer than broad, 0·84 to 1·00 long by 0·68 broad; terminal segment pointed.

Genital organs as in genus. Genital pore marginal on a very low papilla, about two-fifths of length of proglottis from anterior border of same, irregularly alternating from right to left.

Testes arranged in two partial layers between the vitellaria, 50 to 70 in number, spheroidal in shape, 55 to 100μ in diameter. Vas deferens a mass of coils in middle of segment, 0·16 to 0·20 in diameter. Cirrus-sac, 0·36 to 0·40 mm. in length by 0·14 to 0·18 in diameter, extending to near the median line of the segment, lying at right angles to margin of same. Cirrus straight in cirrus-sac.

Vagina opens anterior to cirrus-sac, lies ahead of it for two-thirds of its (cirrus-sac's) length and crosses it ventrally at the beginning of the inner one-third or one-quarter of the same. Small vaginal sphincter, 50μ in diameter, near its opening. Vagina 18μ in diameter just within sphincter, 15μ where it turns posteriorly. Receptaculum seminis anterior to ovary, 20 to 30μ in diameter; spermiduct, 9 to 12μ. Ovary bilobed, lobes ovoidal; whole organ 0·58 mm. in width by 0·12 in length. Oocapt, 25 to 30μ in diameter; oviduct, 25μ. Uterus with 6 to 9 diverticula on each side, anterior end broadly rounded, whole organ, 0·48 to 0·54 mm. in width by 0·64 to 0·70 in length. Uterine pore usually single (sometimes in the form of two separate openings).

Embryo, 20 to 25μ in diameter.

Type host. *Salvelinus marstoni* Garman, red Canadian trout, in posterior portion of intestine, in company with *Abothrium crassum* and *Diphyllobothrium* sp. larv. (vide supra).

Type locality. Lake at Bernard Harbour, Northwest Territories, Canada; C.A.E. Stations 42*o* and 42*r*.

Collected by Mr. Frits Johansen, October, 1915.

Cotypes are deposited in the Victoria Memorial Museum, Ottawa, Canada, (Annelids, etc., Catalogue No. 82), and in the collection of the writer at Chicago, Illinois, U.S.A.

This species resembles *P. filicollis* (Rud.) and *P. esocis* (Schneider) as described by LaRue (1914) in that the testes are arranged in two partial layers and the latter in that the cirrus-sac extends about half way across the proglottis, but it otherwise represents an aggregate of characters, many of which individually or in small groups resemble those of other species of the genus.

Order III CYCLOPHYLLIDEA Beneden

Family I **DILEPIDIDAE** Railliet et Henry 1909, e.p. Luhe 1910

Subfamily **DILEPIDINAE** Railliet et Henry 1909

Genus I **Lateriporus** Fuhrmann 1908

Lateriporus geographicus, sp. nov.

(Figs. 9, 13, 14).

Specific diagnosis.—With the characters of the genus. Medium sized cestodes at least 172 mm. in length by 2·0 in diameter. Scolex almost spherical, 0·56 mm. in length by 0·62 in width. Rostellum stout and truncate, at least 0·16 mm. in length by 0·30 in diameter; nature and arrangement of hooks not observed. Suckers unarmed, not especially prominent, nearly circular in outline, 0·28 mm. in length by 0·24 in width. Unsegmented neck about 1·1 mm. in length by 0·45 in diameter, constricted to 0·28 mm. immediately behind the scolex: shows many transverse rugae closely resembling the foremost segments but due to longitudinal contraction. Anterior segments infundibuliform but much broader than long; middle, more nearly quadrate and about twice as broad as long; posterior, less than twice as broad as long with convex lateral borders, 1·40 mm. in length by 1·95 in breadth.

Genital pore at the middle of the lateral border of the segment on a low rounded papilla, 0·2 mm. in diameter by 0·08 in height and in many segments retracted so that its summit is level with the edge of the proglottis. Opening of vagina immediately ventral to that of cirrus at the bottom of a genital cloaca 0·125 mm. in depth by 0·036 in diameter.

Testes arranged in two or three layers posterior, lateral and somewhat dorsal to the central glands and ducts of the female organs; 15 to 20 in number, spheroidal in shape, 80 to 120μ in diameter. Proximal coils of vas deferens median and near the anterior border of the segment, distal less compact coils surrounded by numerous highly vacuolated glandular cells; no external seminal vesicle. Cirrus-sac almost cylindrical in shape, short and stout, 0·24 mm. in length by 0·07 to 0·09 in width. Cirrus very short and thick and armed with a host of minute stout spinelets.

Vagina thick-walled and muscular from genital cloaca to within the ventral excretory vessel, about 0·11 mm. beyond which it turns abruptly dorsally then medially to become the receptaculum seminis; laterally it courses directly beneath the cirrus-sac but medially it diverges posteriorly. Seminal receptacle ellipsoidal in shape, 0·15 mm. in length by 0·12 in diameter. Ovary median, semiannular in shape, with the forwardly directed convexity bearing about ten short, stout tubules; whole organ, 0·15 mm. in width by 0·09 in length. Shell-gland inconspicuous. Vitelline gland median, spheroidal in shape, about 70μ in diameter. Uterus composed of a median short and slightly coiled canal, leading to a main Λ-shaped stem, from which numerous saccular lobules invade the parenchyma in all directions (Fig. 14). The lateral lobes enlarge before the more median ones, and the whole organ eventually fills up the whole of the medullary parenchyma.

Eggs, measured in toto preparations cleared in oil of wintergreen, 0·125 to 0·145 mm. in diameter, oncospheres 55μ in diameter.

Type host. *Somateria v-nigra* Gray, the Pacific eider, in the stomach, in company with *Aploparaksis* sp. and *Fimbriaria intermedia*.

Type locality. Bernard harbour, Northwest Territories, Canada; C.A.E. Station 49*r*.

Collected by Mr. Frits Johansen, June 27, 1916.

The paratype is deposited in the Victoria Memorial Museum, Ottawa, Canada. (Annelids, etc., Catalogue No. 83).

This species obviously does not belong to *Lateriporus teres* which was described by Krabbe (1869:284) and Fuhrmann (1907:521) from *Somateria mollissima*, the European eider, from Greenland. It resembles, however, one of the other four species of *Lateriporus*, namely *L. biuterinus* Fuhrmann (1908: 56), which was taken from a number of South and Central American birds as well as from the European *Oidemia fusca* (L.), the velvet scoter, a close relative of *Somateria*, in that the uterus is divided into two parts at the median line and each of these is subdivided into a number of lobules. But the lobulation is carried on to a much greater extent in *L. geographicus*, as indicated in figure 14, which represents three stages in the development of the organ. Eventually the two main limbs come close together in the median line posteriorly and the whole parenchyma, cortical as well as medullary, becomes filled with the eggs. On the other hand, *L. geographicus* differs from *L. biuterinus* in that there is no seminal vesicle just outside of (median to) the cirrus-sac; the vagina opens ventral to the cirrus instead of ahead; the receptaculum seminis, vitelline gland and ovary are much smaller; the ovary is differently shaped and lobulated; and, finally, the oncospheres are much larger (55μ vs.

24µ in *L. b.*). The specific name chosen has reference to the map-like contour of the uterus.

Genus 11 **Choanotaenia** Railliet 1896

Choanotaenia passerellae, sp. nov.

(Figs. 10, 15.)

Specific diagnosis. With the characters of the genus. Small cestodes at least 20 mm. in length by 0·95 in maximum breadth. Scolex small, conoidal, about 0·14 mm. long by 0·20 wide. Rostellum cylindrical and spheroidal at tip, 72µ wide; nature and arrangement of hooks not observed. Suckers unarmed, prominent especially posteriorly, circular in outline, at least 90µ in diameter. Unsegmented neck about 0·16 mm. long by 0·20 wide. Anterior proglottides very short; middle infundibuliform and much narrower anteriorly than posteriorly; hindermost, 1·72 mm. in length by 0·95 in width, with somewhat convex lateral borders and more nearly the same width at their anterior borders as at their posterior borders.

Genital pores irregularly alternating, located two-ninths of length of segment from its anterior end. Vaginal opening posterior to and on the same horizontal plane with that of cirrus. Genital cloaca unarmed.

Testes massed in the posterior two-fifths of the segment and surrounding the vitelline gland, 20 to 25 in number, each with maximum diameter of 75µ. Coils of vas deferens median and close to anterior border of segment, 0·15 to 0·20 mm. in diameter. Cirrus-sac, elongated, spindle-shaped, 0·25 to 0·27 mm. in length by 56µ in diameter. Vas deferens coiled proximally in cirrus-sac, straight distally. Cirrus at least 55 to 70µ in length by 18µ in diameter, armed with small, stout pines.

Vagina lies posterior to cirrus-sac and after crossing the large ventral excretory canal is dilated to form an elongated seminal receptacle, the proximal end of which, almost median in position between the ovarian lobes, may be as much as 70µ in diameter when filled with spermatozoa. The bilobed ovary, 0·32 mm. in length by 0·36 in width, occupies the whole of the transverse diameter of the segment between the excretory canals. Each lobe is composed of tubular lobules radiating from a median isthmus about 0·08 mm. in length; that situated on the side bearing the genital apertures is much shorter than the other. Shell-gland median, compact, almost spherical in shape, 70µ in length by 45 in width. Vitelline gland median behind the shell-gland, compact, irregular in shape, 130µ in length by 110 in width. The gravid uterus fills most of the segment, extending beyond the excretory canals on each side.

Eggs almost spherical in shape, 25 to 30µ in diameter, contents (befor cleavage had set in) at least 20µ.

Type host. *Passerella iliaca* (Merrem), the fox sparrow, in the stomach in company with *Aploparaksis elisae* Skrjabin.

Type locality. Teller, Alaska.

Collected by Mr. Frits Johansen, August 3, 1913.

Cotypes are deposited in the Victoria Memorial Museum, Ottawa, Canada (Annelids, etc., Catalogue No. 84), and in the collection of the writer at Chicag

Although I did not observe the nature and arrangement of the hooks on th rostellum of this form, these having evidently been all torn away from the onl two scolices in the small lot of material collected, I consider this species to b new, since in other regards it differs more or less considerably from the speci of *Choanotaenia*, the descriptions of which were available. It closely approach however, *C. parina* (Dujardin 1845) which is found in *Passer domesticus* (L. and other passeriform birds, as shown by the following excerpts from the bri description by Marotel (1899) of that species:

"2 to 3 cm. in length by 0·8 mm. in width. 4 unarmed suckers, 22 to 27 hooks, 19 to 20μ in length, on the rostellum. Neck short, very slightly narrower than the head. About 80 segments; posterior borders projecting, last a little longer than wide. Reproductive openings very irregularly alternating, one-fifth of length of segment from anterior edge. 20 to 25 testes, ellipsoidal, large, axis transverse, located in a little more than the posterior one-third of the segment. Coils of vas deferens in anterior one-third of segment. Two kinds of spines on cirrus; short and stout towards the summit, fine and slender at the base. Ovary with two lateral wings in middle third of segment. Vitelline glands immediately anterior to testes. Vagina opens into a narrow, cylindrical genital cloaca, behind and on the same horizontal plane as the cirrus. Receptaculum seminis between ovarian wings and ahead of yolk gland, not very voluminous and scarcely central. In *Sturnus vulgaris*."

Nevertheless, the differences between the two forms seem to be sufficient to warrant the erection even in the absence of the rostellar hooks of a new species, the first of this genus, so far as I know, to be described from *Passerella iliaca*.

Family II **HYMENOLEPIDIDAE** Railliet et Henry 1909

Subfamily I **HYMENOLEPIDINAE** Ransom 1909

Genus **Hymenolepis** Weinland 1858

Subgenus **Aploparaksis** Clerc 1903

Aploparaksis elisae Skrjabin 1914, e.p

1914: *Aploparaksis elisae*..........SKRJABIN............1914: 451
(Type host, *Fuligula nyroca;* Talass River, near Aulie-Ata, Turkestan.)

Specific diagnosis.—With the character of the genus. Medium-sized cestodes with a length of 120 mm. by a maximum breadth of 1·4 mm. Rostellum (half retracted) 30μ in diameter at base; bears ten hooks, each 25·9μ in length. Anterior segments (where first uteri appear), 0·08 mm. in length by 0·60 to 0·64 in width; posterior (gravid), 0·12 mm. long by 0·93 to 1·4 wide; second last proglottis, convex laterally and freed of most of its eggs, 0·20 mm. long by 0·48 wide. Posterior borders of all but the hindermost segments salient, giving the strobila a fine saw-toothed appearance laterally.

Genital pore situated slightly ahead of, at, or slightly behind the middle of the margin of the segment. Opening of vagina immediately ventral to that of cirrus and at the bottom of a very shallow, funnel-shaped genital atrium, 12μ in dorsoventral diameter and 10μ in transverse diameter (depth).

Testis median, spheroidal in shape, fills up the whole of the segment antero-posteriorly, 0·10 to 0·12 mm. in length by 0·15 to 0·19 in width by 0·11 to 0·12 in depth. Testes are so large that those of consecutive proglottides push by each other and hence often appear as two rows along the strobila. Outer seminal vesicle oval or ellipsoidal in shape, dorsal to inner end of cirrus-sac, 0·140 mm. in transverse diameter (its length), 0·035 and 0·45 in dorsoventral and longitudinal diameters, respectively. Width of proximal coils of vas deferens, 90μ, length, 36μ. In young segments the cirrus-sac extends to the median line; in ripe joints it occupies only one-quarter of the transverse diameter of the strobila; 0·26 to 0·28 mm. in length by 0·023 to 0·027 in diameter. Inner seminal vesicle, 0·172 mm. long by 0·018 in diameter. Cirrus unarmed, 0·110 to 0·125 mm. in length (within the sac).

Most of the vagina is enlarged to form a very large seminal receptacle which extends from just within the genital atrium to past the median line, filling up the whole of the proglottis anteroposteriorly below the cirrus-sac; 0·29 to 0·34 mm. in length by 0·070 to 0·072 in diameter. Ovary somewhat bilobed and lobulated, 0·135 to 0·32 mm. in width by 0·045 to 0·065 in length by 0·35 in depth Vitelline gland ellipsoidal, median, posterior to ovary, 50 to 60μ in diameter. Uterus when first apparent in toto preparations occupies the middle third of the proglottis transversely, when gravid extends well beyond the excretory vessels which appear in transections nearly surrounded by the organ on account of its being somewhat lobulated dorsoventrally. The receptaculum seminis likewise appears imbedded in the dorsal side of the poral half of the uterus. Length of uterus, 0·12 to 0·15 mm., width, 0·75 to 1·00, depth, 0·12 to 0·28 (these differences due to the lobulation).

Eggs spherical; outer envelope, 56μ in average diameter, middle, 37μ, oncosphere, 26 to 30μ.

Habitat. Stomach of *Passerella iliaca* (Merrem), the fox sparrow, in company with *Choanotaenia passerellae* Cooper, sp. nov.; Teller, Alaska, August 3, 1913.

To this species I refer six strips of proglottides without scolices, two of them evidently belonging to the same worm, having a combined length of 56 mm. and maximum breadth of 1·2 mm. Their anatomy agrees with the brief description given by Skrjabin, excepting only for the facts that the antiporal borders of the testes do not extend to the antiporal excretory vessels and the ovaries are much narrower 0·135 to 0·165 mm. rather than 0·29 to 0·32 ("with a width of proglottis of 1·02 mm.") of Skrjabin.

Skrjabin's description is slightly amended to include the latter data, while other specific characteristics are here given for the sake of a clearer definition of this, one of the largest of the species of *Aploparaksis*.

Aploparaksis sp.

To this genus I also refer a lot of small and poorly preserved cestodes taken from the posterior portion of the intestine of a specimen of *Somateria v-nigra* Gray at Bernard harbour on June 27, 1916, at C.A.E. Station 49c. The lot consists of portions of at least two worms, much coiled, without scolices and in such a poor state of preservation that I was unable to ascertain to what species they belong.

However, they resemble *A. birulai* Linstow (1905:8), so far as I know the only species of *Aploparaksis* which has up to date been found in a species of *Somateria*, in the following points: The length is approximately the same (27·5 mm. vs. 24·8 mm. for *A.b.*); the longitudinal muscles are disposed in two layers, an outer among the subcuticular cells and an inner and much stronger in the usual position; there are no calcareous bodies; the genital pore is unilateral and opens in the middle of the lateral border of the segment; the testis is spherical in shape and its diameter is about one-tenth of that of the segment; the cirrus-sac is one-third the diameter of the proglottis in length, namely, 0·16 mm. (by 36μ in diameter); the cirrus is cylindrical and heavily armed; the vagina is situated ventral to the cirrus-sac; the receptaculum seminis, 37 to 50μ in diameter, is ventral to the ovary; and finally the eggs are 37μ (the embryo 25μ) in diameter 40 by 34μ in *A.b.* On the other hand they differ from *A. birulai* in that the lengths of the proglottides are anteriorly, 54μ (vs. 12μ), posteriorly, 60μ (19μ) and when ripe 101μ, while the respective widths are 0·24 mm. (0·13 mm.), 0·38 (0·57) and 0·48 (0·25); the cirrus is much larger, 0·145 by 0·015 mm. (0·023 by 0·0052); and the testis is more median in position. I was able to determine neither the positions nor the courses of the excretory vessels and the nerves. The lengths and widths of the ovary and uterus (when filled with eggs) are, respectively, 0·054 and 0·127 mm., and 0·11 and 0·38 mm.

Subfamily II FIMBRIARIINAE Wolffhügel 1899

Genus Fimbriaria Frölich 1802

Fimbriaria intermedia Fuhrmann 1913

Habitat. Intestine of *Somateria v-nigra* Gray; Bernard harbour, Northwest Territories, June 27, 1916; C.A.E. Station 49*r*.

This species has been well described by Fuhrmann (1913:446-52). A study of the seven specimens and portions of specimens at hand brought out a few differences of dimensions which seem worthy of note: The largest specimen, incomplete posteriorly, was 55 mm. in length (vs. Fuhrmann's 30 to 40 mm.) by 2·5 in width (vs. 1 to 1·5), its pseudoscolex, 2·3 by 1·5 mm.; the calcareous corpuscles in the parenchyma gave maximum dimensions of 12 by 8μ; a typical longitudinal muscular fascicle near the median line was 21μ in dorsoventral diameter by 9 in transverse; the cirrus-sac was on the average larger, namely, 0·34 mm. in length by 0·036 in diameter (vs. 0·2 by 0·03); both the external seminal vesicle and the seminal receptacle were much enlarged with spermatozoa, the latter so much so, in fact, that it was larger than the former a temporary condition no doubt; the ovary was from 0·8 to 0·9 mm. in width; the vitelline gland was located a little closer to the antiporal border of the ovary than to the poral margin and was 0·13 mm. in width by 0·11 in length; eggs ellipsoidal in shape, 36 by 27μ in dimensions, embryos spherical, 22μ in diameter.

By placing the genus *Fimbriaria* in the family Hymenolepididae I am following the advice of Fuhrmann (1913:456) who has emphasized the many characters common to the two groups and the impossibility of maintaining the family Fimbriariidae. However, on account of its very aberrant structure it must be separated considerably from the other genera of the family, hence the use of Wolffhügel's subfamily name Fimbriariinae.

Family III TAENIIDAE Ludwig 1886

Genus Taenia Linneus 1758

Taenia coenurus Küchenmeister 1853

To this species I refer a lot of ten isolated proglottides taken from the foeces of one of the dogs of the expedition at Collinson point, Alaskan arctic coast, on September 23, 1913. Although they are past the gravid stage, each containing only a few eggs, and the central reproductive glands and ducts are all but completely degenerated, they agree so well with the description of the species given by Deffke (1891) that there can be no doubt as to their identity. They vary in length from 7·0 to 8·0 mm. and in maximum diameter from 2 to 2·8 mm.; the dimensions of the cirrus-sac are 0·32 by 0·08 mm.; there are from 15 to 18 lateral uterine diverticula; and the eggs are nearly spherical and from 30 to 37 μ in maximum diameter.

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*Only the most specific references used are here listed.

EXPLANATION OF FIGURES.

cs	cirrus-sac	*rs*	receptaculum seminis
cvd	common vitelline duct	*t*	testis(es)
ev	excretory vessel	*u*	uterus
lc	Laurer's canal	*v*	vagina
ns	nerve strand	*vd*	vitelline duct
od	oviduct	*vg*	vitelline gland(s)
ov	ovary	*vr*	vitelline reservoir

vas deferens

Unless otherwise stated, the lines indicating the magnifications of the figures represent 0·5 mm.

PLATE I

Fig. 1. *Epibdella hippoglossi*, hooks of posterior sucker, surficial view.

Fig. 2. *Epibdella hippoglossi*, same, lateral view.

Fig. 3. *Orthosplanchnus arcticus*, ovary and central connections of the female reproductive ducts. The line represents 0·2 mm.

Fig. 4. *Diphyllobothrium canadense*, scolex, surficial view.

Fig. 5. *Diphyllobothrium canadense*, same, lateral view.

Fig. 6. *Diphyllobothrium* sp. larv. from *Salvelinus marstoni*, scolex, surficial view.

Fig. 7. *Diphyllobothrium* sp. larv., same, lateral view.

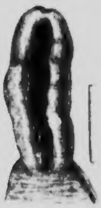
Fig. 8. *Proteocephalus arcticus*, scolex surficial view. The line represents 0·2 mm.

Fig. 9. *Laterporus geographicus*, scolex, surficial view.

Fig. 10. *Choanotaenia passerellae*, scolex, surficial view. The line represents 0·2 mm.

PLATE I.

4



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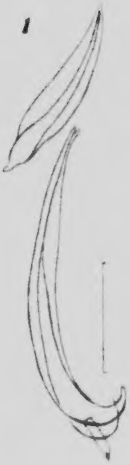

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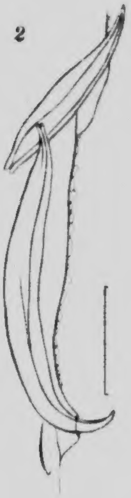

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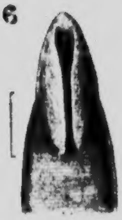

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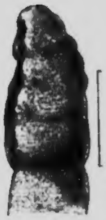

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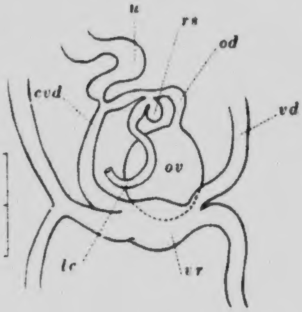

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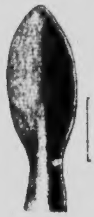

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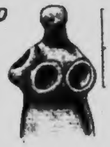

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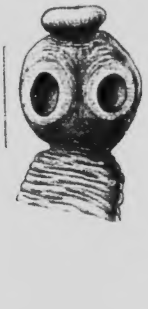

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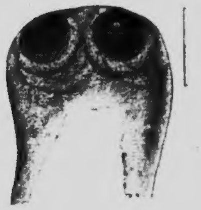

PLATE II.

Fig. 11. *Diphyllobothrium canadense*, ripe proglottis, surficial view, showing testes on the right and vitelline follicles on the left.

Fig. 12. *Protocephalus arcticus*, ripe proglottis, surficial view, testes not shown.

Fig. 13. *Lateriporus geographicus*, mature proglottis, surficial view, uterus and receptaculum seminis not yet developed.

Fig. 14. *Lateriporus geographicus*, mature proglottides, surficial views, showing three stages of the development of the uterus which is shaded.

Fig. 15. *Choanotaenia passerellae*, mature proglottis, surficial view, uterus not yet developed.

PLATE II.

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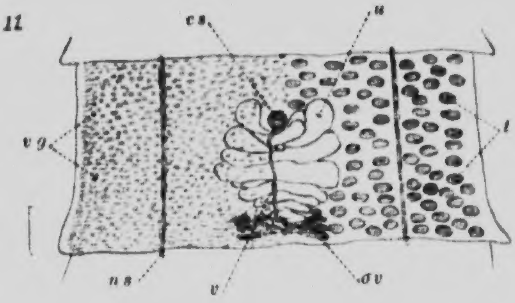

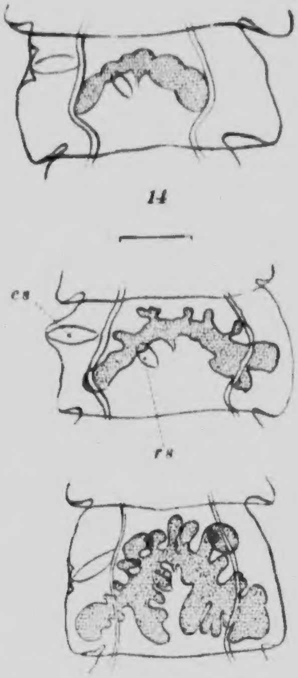

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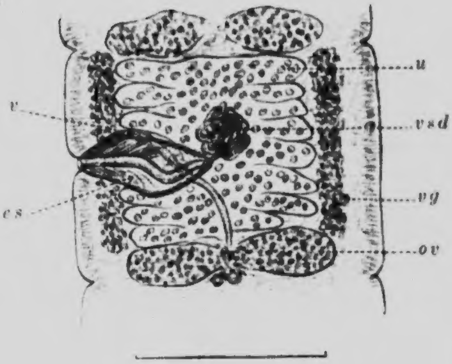

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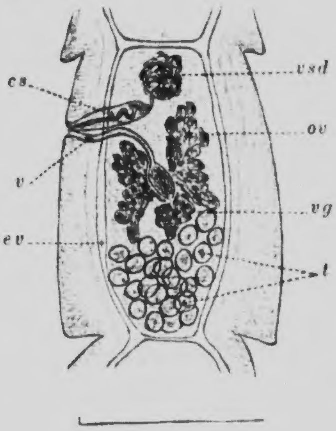

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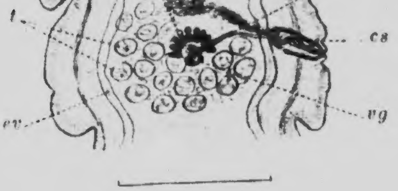

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